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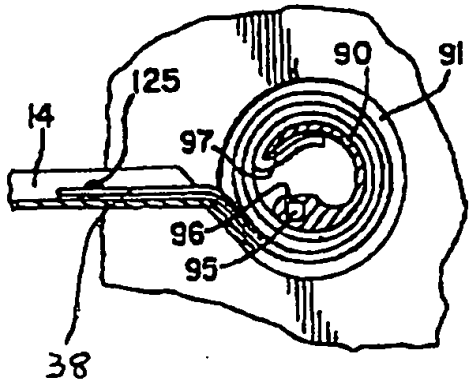
(54) Title: WINDING ASSEMBLY AND ROLLED FOOD PRODUCT

(57) Abstract

A winding assembly (10) for manufacturing individual pieces of rolled product includes a sliding rolling unit (12), a product feed guide (14), a drive unit (16), a timing regulator (18) and a securing unit. Several alternative roll-up devices are featured including a vacuum device (630), a three-legged prong device (230) and a forced air device (730). Preferably a nozzle (110) deposits a drop of edible adhesive adjacent the trailing end of a strip of support material, which is then used to adhere the trailing end to the back side of the next outermost winding, keeping the roll in a woundup state.



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WINDING ASSEMBLY AND ROLLED FOOD PRODUCT

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of U.S. Patent Application Serial No. 08/616,754 filed March 15, 1996, entitled "Winding Assembly and Rolled Food Product", which is a continuation-in-part of U.S. Patent Application Serial No. 08/249,753, filed May 26, 1994, entitled "Winding Assembly", abandoned. The disclosure of the foregoing applications are hereby incorporated by reference.

BACKGROUND OF INVENTION

This invention is generally related to rolling or winding devices, and is specifically directed to a winding assembly for manufacturing individual pieces of rolled food product, as well as the method of operation and the rolled food product itself.

Like other manufacturing businesses, the food processing industry is rapidly developing ways to increase productivity by automating food processing. Because an automated factory is more efficient, less expensive and more sanitary than manual labor, new and improved devices are continuously developed.

Foods of all varieties are now produced in completely automated assembly lines. Pastries, cookies, candies, chips, pizza, egg rolls, burritos, enchiladas, ravioli, and manicotti are just a few examples of food products completely processed by machines. Machinery now

accomplishes a variety of functions once performed only by humans. Processing equipment cuts, dices, slices, shapes, decorates, embosses, extrudes, folds, fills, rolls and packages food without human handling.

Rolled food products are particularly suitable for the automated assembly line. U.S. Patent No. 5,012,726, for example, discloses an automatic processing line for producing a folded, rolled food product. This processing line includes a synchronized conveyor having a plurality of work stations. Each work station comprises a sheet feeding mechanism, a foodstuff loading mechanism, a rolling mechanism, and a means for discharging the rolled product from the conveyor. The rolling mechanism consists of two spaced apart fingers that straddle a sheet of dough. A single finger is positioned between the two fingers to grip the folded dough. As the fingers rotate, a rolled product is formed. The single finger is then removed from the dough and the rolled product drops onto a conveyor.

Similarly, U.S. Patent No. 5,284,667 discloses another food assembly line which also produces a rolled product. A food substance is extruded onto an external support material, and strips of food product are then cut to a desired length and rolled into multiple coils. Like U.S. Patent No. 5,012,726, a fork is used to roll the food product. However, in order to remove the coiled food, the fork is withdrawn by axially sliding it relative to the roll, dropping the rolled food onto a conveyor.

In addition, the equipment of U.S. Patent No. 5,284,667 is designed to roll several strips of material at a time. Therefore, if one strip of material misfeeds, breaks or fails during coiling in the rolling means, the entire line must be shutdown. Moreover, in order to secure the rolled strip of food in a rolled position, a pressure plate advancing between a first and second position by way of a pneumatic cylinder is necessitated

as part of the rolling device. As a result, the winding assembly takes up a lot of space and is complicated.

U.S. Patent No. 3,669,007 is directed to yet another assembly line for rolling a food product. This assembly line is particularly suitable for processing burritos, enchiladas, egg and cabbage rolls, blintzes and cannelloni. The assembly line contains a rolling device which again utilizes a fork whose fingers are withdrawn from the engagement of a rolled product by sliding the fork into a disengaging position. However, this rolling device requires a combination of gears and chain links in order to rotate the fork, complicating the overall mechanism.

A need exists, therefore, for a simplified device, easy to maintain and replace in an assembly line, offering the flexibility of a variety of rolling mechanisms.

The product made by the apparatus disclosed in U.S. Patent No. 5,455,053 (hereby incorporated herein by reference) is a food product carried on a strip of support material and fashioned into a roll. A label is secured to the trailing end of the strip of support material so as to hold the roll in a wound-up state.

One problem with this product has been the fact that the labels, once removed when the product is consumed, have to be disposed of. Since the product is consumed primarily by children, there has been a problem in the past with the children applying the removed labels to furniture, clothing or other places where they are undesired and inappropriate. Hence, if the rolled product could be produced without the label, it would be a benefit. The problem with this, however, is that the product unrolls once it is removed from the winding equipment if the label is not applied, making it difficult to package the product.

SUMMARY OF THE INVENTION

In one aspect, the present invention is a winding assembly for manufacturing individual rolled-up strips of material. The preferred embodiment is a compact, uncomplicated device, particularly suitable for winding or coiling strips of food product. The preferred winding assembly features a product feed guide, a rolling unit, a drive unit and a timing regulator.

A strip of food product is fed to the rolling unit via the product feed guide. The timing regulator senses the presence of the food strip and initiates the rotation of the rolling unit. In a preferred embodiment, the rolling unit uses pressurized air to hold the leading end of the strip of material while the strip is rolled.

In an improved embodiment, an edible adhesive is applied adjacent the trailing end of the food product. As the trailing end wraps around the next to last winding, the adhesive holds the roll in a wound-up state until the product can be packaged. This improvement thus solves the problem of keeping the product wound without using a label.

The winding assemblies of the present invention are simple to construct, maintain and operate.

The preferred winding assembly utilizes a wide variety of rolling devices, any one of which is easily replaced in an assembly line.

Because no label is applied in the improved embodiment, labels do not get removed from the product and stuck on furniture, clothing or other inappropriate locations.

These and other advantages of the invention will be readily apparent from the accompanying drawings and detailed description of the preferred embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a typical assembly line for a rolled food item.

FIG. 19 is a top elevational view of a forced air embodiment of the roll-up device, used in an improved embodiment of the invention.

FIG. 20 is a side elevational view of the forced air embodiment of the roll-up device.

FIG. 21 is an exploded view of some of the components used in the forced air embodiment of FIGS. 19 and 20.

FIG. 22 is a cross-sectional view taken along line 22-22 of FIG. 21.

FIG. 23 is a cross-sectional view taken along line 23-23 of FIG. 21.

FIG. 24 is a perspective view of a section of the assembly line used in the improved embodiment of the invention.

FIG. 25 is a cross-sectional view of the nozzle and air activated feed device shown in FIG. 24.

FIG. 26 is a side elevational view of the roll-up device of FIG. 19 showing a partially rolled up food product thereon.

DETAILED DESCRIPTION OF THE DRAWINGS AND PREFERRED EMBODIMENTS

The subject invention is illustrated in a several preferred embodiments offering several alternative roll-up devices. These embodiments are particularly suited for rolling food products such as candy or other snack foods. However, the present invention may be used for many types of food products.

Referring to FIGS. 1 through 7 and 18, the first embodiment of the present invention includes a winding assembly 10, suitable for rolling food products, particularly foods such as gum and candy. The winding assembly 10 comprises a rolling unit 12 for rolling a strip of food product, a product feed guide 14 for receiving the strip of food product, a drive unit 16 for moving the rolling unit between an extended position and a retracted position, and a timing regulator 18 for

FIG. 2 is a perspective view of a series of winding assemblies shown as part of an assembly line.

FIG. 3 is a front side perspective view of the winding assembly of the first embodiment of the invention.

FIG. 4 is a rear side perspective view of the winding assembly of FIG. 3.

FIG. 5 is a front elevational view of the winding assembly of FIG. 3.

FIG. 6 is a side elevational view of the winding assembly of FIG. 3.

FIG. 7 is a top elevational view of the winding assembly of FIG. 3.

FIG. 8 is a top elevational view of a three prong embodiment of the roll-up device.

FIG. 9 is a side elevational view of the three prong embodiment of the roll-up device.

FIG. 10 is a top elevational view of a C-shape embodiment of the roll-up device.

FIG. 11 is a side elevational view of the C-shape embodiment of the roll-up device.

FIG. 12 is a top elevational view of a U-shape embodiment of the roll-up device.

FIG. 13 is a side elevational view of the U-shape embodiment of the roll-up device.

FIG. 14 is a top elevational view of a four legged T embodiment of the roll-up device.

FIG. 15 is a side elevational view of the four legged T embodiment of the roll-up device.

FIG. 16 is a top elevational view of a vacuum embodiment of the roll-up device.

FIG. 17 is a side elevational view of the vacuum embodiment of the roll-up device.

FIG. 18 is a front elevational view of an embodiment of the securing unit used with the winding assembly of FIG. 3.

controlling the rolling unit 12 and the drive unit 16. In the first embodiment, the winding assembly 10 also includes a securing unit 20 for securing the rolled up strip of food product.

FIG. 1 depicts a processing line 22 suitable for implementing a preferred embodiment of the subject invention. Referring specifically to FIG. 1, strips of pre-slit paper 17 are fed onto a carrier conveyor 19 by a paper feed 25, and urged toward an extruder 15. Flowable food product, such as candy or a dehydrated fruit based material, is then placed on each individual strip of paper 17.

The paper feed 25 used in the preferred embodiment is of the type well known to those skilled in the art. The paper feed 25 may utilize several individual rolls of paper at a time. Each roll of paper is supported independently of the other in a rack of pivoting roll arms (not shown). The paper strips 17 are fed through a series of guide rollers 27 onto the carrier conveyor 19. The carrier conveyor 19 transports and cools the food product from the paper feed to an embosser 21. Preferably the carrier conveyor includes a conveyor belt to which the paper is held by vacuum.

Pre-cooked food product in the form of a slurry, flowable solid or liquid is pumped from an adjacent kitchen (not shown) through a product feed line 13 to the extruder 15. Flowable food product is extruded onto the paper strips 17 by the extruder 15. The pre-cooked food product is heated to a temperature where it remains flowable during the extrusion process.

The extruder 15 utilized in connection with the present invention may be any one of several types well known to those skilled in the art. A typical extruder 15 will comprise a closed hopper (not shown) and die (not shown) whereby food product is pumped through the closed hopper and then forced through the die onto the paper strips 17.

Often candy, gum or other similar substances are embossed with designs or motifs that increase marketability and consumer appeal. In the processing line 22 of FIG. 1, after the food product is extruded onto the paper strips 17, the strips of food product 38 are conveyed to an embosser 21 which inks a design, motif or other pattern onto the softened solid substance. As it is conveyed from the extruder 15 to the embosser 21, the food product cools and solidifies. The embosser 21 inks designs on the strips of food product 38 without removing the food product from the paper 17.

An embosser 21 will typically comprise a cylinder (not shown) having raised characters and letters from the base circumference of the cylinder. Ink is pumped into a porous feeding wheel (not shown). The porous feeding wheel transfers the edible ink to a transfer ink roller (not shown). The transfer ink roller is in contract with the embossing wheel and transfers ink to the raised portion of the cylinder. As strips of food product 38 pass under the embossing wheel, the food product is inked and embossed.

Embossed solid strips of food product 38 are then cut into predetermined lengths. Many types of cutting devices well known to those skilled in the art may be utilized to cut the food product strips 38. However, in the processing line 22 of FIG. 1, a rotary knife 23 crosscuts the strips of food product 38 substantially simultaneously and substantially at an angle perpendicular to the conveyor carrier 19 before the food strips 38 are sent to a winding unit 24.

After the strips of food product are cut to a desired length, they are transferred to a timing feed belt 26 where the strips are accelerated into the winding unit 24. As shown in FIG. 2, the winding unit 24 comprises one or more multiple winding assemblies 10, one for each processed strip of food product. Each strip of food product is wound individually in one of the winding

assemblies 10. A winding assembly 10 rolls a strip of food product and just before the completion of the rolling, a label (not shown) is applied. Afterwards the individually rolled food product drops down to a finished food conveyor 28 as shown in the figures. The rolled food product is then conveyed on the finished food conveyor 28 to a horizontal packaging machine (not shown).

As shown in FIGS. 3, 5, 6 and 7, the winding assembly 10 of the subject invention features a product feed guide 14 of simple construction requiring low maintenance. The product feed guide 14 receives a strip of food product 38 and guides the strip to the rolling unit 12. In the preferred embodiment, the product feed guide 14 is located adjacent to a front support plate 34. The product feed guide 14 resembles a slide having a trough-like shape.

The rolling unit 12 comprises a roll-up device 30 coupled to and rotatably propelled by a motor 32. The roll-up device 30 outwardly extends from the motor 32 and engages the front support plate 34 via a disk 73. The roll-up device 30 may be coupled to the motor 32 by a pins bracket (not shown) or other device commonly known to those skilled in the art. The rolling unit 12 moves back and forth between an extended position and a retracted position. In the extended position, the roll-up device 30 extends beyond the front support plate 34. As a strip of food product 38 is fed to the rolling unit 12, the strip of food product 38 fastens or hooks onto the roll-up device 30. in the retracted position (not shown in FIGS. 3 through 7), the roll-up device 30 retreats just beyond the front support plate 34 so as to allow the rolled up strip of food product 38 to fall free.

The winding assembly 10 also includes a drive unit 16. In the preferred embodiment, the drive unit 16 comprises a pair of pneumatic cylinders 40 designed to

reciprocate within an enclosure 43 on a tube-like slide (not shown). To move the rolling unit 12 between the extended and retracted positions, the cylinders 40 slide within the enclosure 43. The enclosure 43 is preferably mounted on a bottom support plate 36 having legs 35.

As shown in the FIGS. 3, 4, 6 and 7, each cylinder 40 has an inner end 40a and an outer end 40b. The inner end 40a of each pneumatic cylinder 40 is attached to a mounting bracket 44. The motor 32 is attached to the mounting bracket 44. The roll-up device 30 is connected to the motor 32. The outer end 40b of each cylinder 40 has a cylinder stop 46. In order to move the rolling unit 12 to the extended position as depicted in FIGS. 3 through 7, air pressure is applied to each cylinder 40 which slides the mounting bracket 44 next to and abutting the front support plate 34. The roll-up device 30 is thus urged forward to extend beyond the front support plate 34. In the extended position, the mounting bracket 44 is in abutting contact with the support plate 34, as the cylinder stop 46 prevents the cylinder 40 from reaching beyond the proper distance necessary.

In order to synchronize the operation of the rolling unit 12 with the drive unit 16, the present invention includes a timing regulator 18. In the preferred embodiment, the timing regulator 18 comprises a product detector 48 for sensing the presence of a strip of food product 38 and a counter mechanism 50 for counting the number of revolutions or rotations of the roll-up device 30.

The product detector 48 may be of any type commonly known to those skilled in the art. In the preferred embodiment of the present invention, the product detector 48 is an electronic or photo-electric eye positioned on the front plate support 34. Once the presence of a strip of food product 38 is sensed, an electronic signal is sent from the eye 48 to a relay 54

or other type of switching device. This relay 54 in turn sends an electronic signal to the motor 32 to start turning the roll-up device 30.

As the roll-up device 30 rotates, the counter mechanism 50 counts a designated number of revolutions or rotations of the roll-up device 30. Once a predetermined number of revolutions is reached, a signal is sent back to the relay 54 and the motor 32 is stopped. Preferably the motor is controlled so that it starts winding slowly, then speeds up to a wind-up speed greater than the conveyor speed. In the preferred embodiment, the counter mechanism 50 comprises a photo or counter eye 52 oppositely and horizontally positioned from a speed flag 56. The speed flag 56, shown clearly in FIG. 4, preferably has a reflector (not shown) which reflects the light of the eye 52 to count the number of turns or revolutions of the roll-up device 30.

Once the roll-up device 30 has coiled a set amount of food product, as the roll-up device 30 is rotating, a securing tape is wrapped around the rolled up strip in order to prevent it from unrolling. The securing tape is a pre-glued, pre-cut label on a backing web, typically supplied in individual rolls and contained with the securing unit 20. The securing unit 20 acts as a label dispenser and may be of a variety of constructions well known to those skilled in the art.

As shown in FIG. 18, the securing unit 20 of the preferred embodiment comprises a mounting block 81 that holds a supply roll of securing tape 80, a rear power rewinder 82, a supply guide 84, a pressure plate 86, a winder motor 85 and a tensioning device 88. In the preferred embodiment, securing tape 80 is in the form of pre-glued labels placed onto and supplied from a backing web 83. The supply guide 84 threads the pre-glued labels within the securing unit 20 to the pressure plate 86. The pressure plate 86 keeps the roll compact as it expands, rolling up on the roll-up device 12. After the

food product is completely wound up, the winder motor 85 powers the rear powered rewinder 82. The securing tape 80 separates from the backing web 83 as it is pulled around a tight bend at the end of guide plate 87. The exposed end of the label 80 is then caught by the trailing end of the strip of food product. This pulls an individual label (shown exaggerated in FIG. 18) from the backing web 83 around the outside of the coiled food product. The rear power rewinder 82 then rewinds the backing web as the pre-glued label is attached to the rolled up food product. The pre-glued label is held against the rotating food product by the pressure plate 86. Once the securing tape has been attached, the roll-up device stops rotating. Each pneumatic cylinder 40 is then released, and the roll-up device 30 moves to the retracted position.

Upon retracting the roll-up device 30, the rolled food strip 38 abuts the front support plate 34 and falls from the roll-up device 30. A signal is sent to the relay to cause the cylinders 40a, 40b to oppositely move the roll-up device 30 to the extended position. Again, the cylinder 40 moves the mounting bracket 44 coupled to the motor 32, with the roll-up device 30 attached, back to the extended position where the mounting bracket 44 abuts the front support plate 34. At this time, the roll-up device 30 is again in the extended position, extending through the front support plate. The cylinder stop 46 at the second end 40b of the cylinder 40 prevents the cylinder 40 from moving beyond the appropriate distance between the extended and the retracted position.

A variety of roll-up devices 30 may be utilized in the present invention. One roll-device well known in the art is the fork roll-up device 130 as shown in FIGS. 3 through 7. Other roll-up devices 30 may be used in lieu of the fork device. Examples of these devices are shown in FIGS. 8-17 and 19-23.

FIGS. 8 and 9 depict a three prong roll-up device 230 having three legs 37, 39 and 41. A strip of food product 38 is caught in between two of the three legs and wound around all three legs 37, 39 and 41, forming a rolled product. FIGS. 10 and 11 show a C-shaped rolling device 330 which is designed to catch the strip of food product 38 in the center 45 of the C-shape and wind the strip 38 around the outside perimeter 47 of the C-shape. Similarly, FIGS. 12 and 13 show a U-shaped rolling device 430 which is designed to catch the strip of food product 38 in the center 49 of the U-shape and wind the strip 38 around the outside perimeter 51 of the U-shape.

FIGS. 14 and 15 show yet another embodiment of an alternative rolling device, the four legged T rolling device 530. A single shaft forms a central longitudinal axis 53 for connecting four T shaped legs 57, 59, 61 and 63. The axis 53 outwardly extends from the motor 32 which spins the four legs 57, 59, 61 and 63 simultaneously. A strip of food product 38 catches between two of the four T shaped legs 57, 59, 61 and 63 and winds around the outside of each leg 57, 59, 61 and 63 of the four legged T rolling device 530.

FIGS. 16 and 17 depicts yet another embodiment of the roll-up device, a vacuum roll-up device 630. This type of device is different from the above devices for this roll-up device 630 operates under vacuum pressure. As shown in FIG. 16, the vacuum roll-up device 630 comprises a vacuum air tube 64, a swivel joint 65, a rotating sleeve 71, a hose end adapter 66, an air hose 67, a vacuum hose 68, a vacuum air hose 69, and a three way solenoid valve 70. Both the swivel joint 65 and the rotating sleeve 71 contain a channel space 72 which connects to the hose end adapter 66 and allows for the vacuum to be maintained on the vacuum air tube 64.

In operation, the leading edge of the food product strip 38 passes over the vacuum air tube 64. The

leading edge of the food product strip 38 triggers the product detector 48 and starts the vacuum air tube 64 to rotate. As the vacuum air tube 64 rotates, the swivel joint 65 remains stationary while the rotating sleeve 71 turns. A vacuum is maintained on the food product through the vacuum air tube 64 via the vacuum air hoses 68, 69. Once the roll-up device 630 has coiled a set amount of food product, as the roll-up device 630 is rotating, securing tape is wrapped around the rolled-up strip in order to prevent it from unrolling. Air is then applied to the vacuum air tube 64 via the air hose 67 to eliminate the vacuum and loosen the coiled food product from the vacuum air tube 64.

FIGS. 19 and 20 show yet another embodiment of a roll-up device, a forced air roll-up device 730. This device can be used with the first embodiment of the invention, as already described, but is specifically adapted to be used in an improved embodiment in which no strapping or label is applied to hold the roll closed, as explained in more detail below.

The forced air roll-up device 730 is different from the other roll-up devices in that it uses forced air. As shown in FIG. 19, it uses a motor 32 reciprocatingly mounted on a front support plate 34 and controlled by a product detector 48, as well as the product guide 14 as in the other devices. An air winding tube 90 protrudes through a product guide extractor 91. An air hose 92 connected to an air solenoid valve 93 brings compressed air from a source (not shown) to a stationary air housing 94 surrounding the back end of the air winding tube 90. As best seen in FIGS. 21 - 23, air travels through a passageway 95 in the air winding tube 90 from its back end out to where the air can exit through holes 96 that face toward the inside of air winding tube 90, just behind the product contacting surface 97. As the strip of food product enters the longitudinal slot between the product contacting surface

97 and the air holes 96, the product detector 48 actuates air solenoid valve 93 and air is forced out of holes 96. The air blows the leading end of the strip of food product upwards so that the product strip curves around the product contacting surface 97. (See FIG. 26.) Then as motor 32 rotates air winding tube 90, the product contacting surface pulls the leading end of the product and starts wrapping the product around the outer surface of air winding tube 90.

As best seen in the exploded view of FIG. 21, the air winding tube 90 has four air holes 96 spaced along the longitudinal slot into which the product passes. The air winding tube has a hole 98 on its back end which allows air from the stationary air housing 94 into passage 95. The opposite end of passage 95 is blocked by a plug 99, sealing the outer end of passage 95.

The stationary air housing 94 includes a threaded inlet 101 into which air hose 92 may be secured. O-rings 102 and 103 fit on grooves 104 and 105 of air winding tube 90 to seal the air winding tube 90 back end within the stationary air housing 94. A washer 106 and snap ring 107 hold the stationary air housing 94 and air winding tube 90 together.

In the preferred embodiment, the product enters the air winding tube 90 until the leading end stops against the back wall of air winding tube 90. The motor 32 starts turning after a delay of 5 milliseconds from when the air is forced through holes 96. As the air winding tube 90 starts to spin, because the leading end of the product strip is forced toward the top of the air winding tube 90, centrifical force tends to force the leading end of the product against the inside wall of the tube and hold it in that position. Preferably the product contacting surface 97 has a sharp edge that penetrates the top side of the food product, thus getting

a good grip to hold the product in the tube as the tube 90 starts to spin.

An improved embodiment of the windup assembly does not use a strapping or label to hold the product roll closed. Instead, an edible adhesive is applied on top of the food surface near the trailing end of the product. The adhesive then adheres the trailing end of the food product to the next outermost layer as the roll is formed, and holds it in this position while the roll is packaged.

A preferred method of applying the edible adhesive is to use an air actuated nozzle 110 for each strip of product being produced. The preferred edible adhesive is corn syrup. FIG. 24 shows a system for applying a drop of corn syrup simultaneously on each of twelve adjacent strips of food material 38. In the presently preferred embodiment, the nozzles 110 are located along the production line of FIG. 1 after the embosser 21 but prior to rotary knife 23. Thus the corn syrup is applied while the strips 38 are still continuous. The placement of the nozzles can be adjusted so that the corn syrup, which is hot when applied, can cool to a tacky state as the product strip moves along. The corn syrup will then be tacky by the time the trailing end of the product is would around the other layers. In this way the trailing end is held against the rest of the roll, keeping it in a wound-up state.

Corn syrup is preferably held in a temperature controlled reservoir (not shown) and pumped through hoses 112 to three headers 114 which each supply four nozzles 110. The nozzles are air actuated. When triggered, they each dispense one drop of corn syrup onto the strip of food 38 underlying the nozzle 110. The timing for triggering the nozzles will depend on the line speed, and is preferably triggered by a controller that also actuates the rotary knife 23. In this way, the nozzles 110 can be synchronized so that the drop of corn syrup is

placed in the correct spot on the travelling strip of food material 38. Presently it is preferred to deposit the drop about 1/2 inch from what will become the trailing end of the product. FIG. 26 shows a partially wound up roll of food product 38 with a drop of adhesive 125 near the trailing end.

A presently preferred nozzle 110 is shown in FIG. 25. Corn syrup enters through an inlet 116 connected to hose 112. The corn syrup stays in a reservoir 118 within header 114 until it is dispensed. Pressurized air is fed through inlet 122 into an air reservoir 124. The nozzle 110 includes a ball valve 126 and a return spring 128. When actuated, the ball valve allows a drop of corn syrup to pass out of the nozzle 110 and onto the product. The entire structure is secured by a mounting bracket 132.

A preferred nozzle is supplied by Nordson Corporation, as model No. 237212, having an opening of 0.012 inches. The corn syrup is preferably colored to match the color of the food product which is being rolled up. A preferred corn syrup has a DE (dextrose equivalent) of about 42.

One of the advantages of the improved embodiment of the invention is that the entire structure used to feed strapping or labels is no longer necessary. Also, the cost of using corn syrup is less than that of printed labels.

The foregoing detailed description has been given only by way of example and it will be understood by those skilled in the art that many modifications may be made in the structure of the illustrated and described preferred embodiment without departing from the spirit and scope of the invention as herein after claimed.

We Claim:

1. A food item comprising, in combination: a strip of support material having first and second opposing surfaces, leading and trailing ends and first and second side edges, with the leading end being a cut end, with the strip of support material having a width between the first and second edges and having a length between the trailing and leading ends, with the width being minimal relative to the length of the support material; a strip of food supported upon the first surface of the strip of support material and having side edges spaced from the side edges of the strip of support material and a length which does not extend beyond the leading and trailing ends of the support material, with the strip of support material and the strip of food supported thereon being rolled around the cut leading end into a roll having multiple rotations with the strip of support material located on the outside of the roll; and an edible adhesive adhering the food material at or near the trailing end of the strip to the second surface of the support material, thereby holding the trailing end adjacent the next innermost winding.

2. The food item of claim 1 wherein the edible adhesive comprises corn syrup.

3. The food item of claim 1 wherein the edible adhesive is colored to approximately match the food material.

4. The food item of claim 2 wherein the corn syrup has a D.E. of about 42.

5. A winding assembly for rolling a strip of food product comprising:

a) a rolling unit for winding the strip of food product into a rolled food product, said rolling unit having a roll-up device and a motor coupled to said roll-up device for rotating said roll-up device;

b) a product feed guide for receiving the strip of food product and feeding the strip of food product into said roll-up device;

c) the roll-up device having a passageway and one or more holes connecting to the passageway for supplying compressed air to blow against a leading end of the strip of food material.

6. A method for fabricating a rolled food item comprising the steps of: providing a strip of support material and food, with the strip of support material and food having a leading end and a trailing end; extending the leading end of the strip of support material and food into a longitudinal slot within a winding tube, one side of the slot constituting a contacting surface and the other side of the slot comprising one or more air holes; forcing air out of said one or more holes, the air pushing the leading end of the strip of support material toward the contacting surface; rotating the tube about an axis parallel to the length of the tube until the strip of support material and food is wound on the tube into a roll; and axially sliding the tube relative to the roll.

7. A winding assembly for rolling a strip of food product comprising:

a) a front support plate;

b) a rolling unit for winding the strip of food product into a rolled food product, said rolling unit having a roll-up device;

c) a product feed guide for receiving the strip of food product and feeding the strip of food product into said roll-up device, said product feed guide positioned adjacent to said front support plate;

d) a drive unit for moving said roll-up device between an extended position and a retracted position; and

e) a timing regulator for controlling said drive unit and said rolling unit.

8. The winding assembly of claim 7 wherein said motor has a first and a second end, said roll-up device slidably engages said front support plate and extends outwardly from said first end of said motor.

9. The winding assembly of claim 7 wherein said drive unit is mounted onto a bottom support plate.

10. The winding assembly of claim 7 wherein said timing regulator comprises a product detector for sensing the presence of the strip of food product and a counter mechanism for counting rotations of said roll-up device.

11. The winding assembly of claim 10 wherein said product detector is positioned on said front support plate.

12. The winding assembly of claim 10 wherein said counter mechanism comprises a counter eye and a speed flag having a reflector, said speed flag being positioned on said second end of said motor, said counter eye being positioned horizontally opposite to said speed flag.

13. The winding assembly of claim 7 wherein said drive unit comprises at least one pneumatic cylinder contained within an enclosure, each said cylinder having an inner and outer end axially extending from said enclosure, said inner end being connected to said mounting bracket, said outer end having a cylinder stop.

14. The winding assembly of claim 13 wherein said drive unit further comprises a mounting bracket, said motor being mounted onto said bracket.

15. A winding assembly for rolling a strip of food product comprising:

a) a rolling unit having a roll-up device and a motor coupled to said roll-up device, said motor having a first and a second end, said roll-up device being slidably engaged within a front support plate and extending outwardly from said first end of said motor;

b) a product feed guide for moving said roll-up device between an extended position and a retracted position, said motor being mounted onto said drive unit with a mounting bracket; and

c) a timing regulator for synchronizing said rolling unit and said drive unit, the timing regulator having a product detector for sensing the presence of the strip of food product and a counter mechanism for determining the amount of food product coiled by said roll-up device.

16. The winding assembly of claim 15 wherein said drive unit comprises two hydraulic cylinders positioned within an enclosure, each of said cylinders having an inner and outer end axially extending from said enclosure, said inner end of each said cylinder being connected to said mounting bracket, each said outer end having a cylinder stop.

17. The winding assembly of claim 15 wherein said product detector detects the strip of food product, said motor turns said roll-up device, said counter mechanism totals the number of revolutions of said rolling unit to create a rolled strip of food product, and said rolling unit retracts from said extended position to said retracted position.

18. The winding assembly of claim 7 wherein said roll-up device comprises three legs position in a spaced relationship wherein the strip of fold product is placed in between two of three legs and wound around each of the three legs to form a rolled food product.

19. The winding assembly of claim 7 wherein said roll-up device comprises a C-shaped device having a center and an outside perimeter wherein the strip of food product is caught within the center of the C-shaped device and wound around said outside perimeter.

20. The winding assembly of claim 7 wherein said roll-up device comprises a U-shaped device having a center and an outside perimeter wherein the strip of food product is caught within the center of the U-shaped device and wound around said outside perimeter.

21. The winding assembly of claim 7 wherein said roll-up device comprises a four legged T device having a single shaft forming a central longitudinal axis and four T shaped legs connected to said axis.

22. The winding assembly of claim 7 wherein said roll-up device comprises a vacuum roll-up device, said vacuum roll-up device operating under vacuum pressure and comprising a vacuum air tube; a swivel joint; a rotating sleeve connected to said swivel joint; a hose end adapter; and a vacuum air hose, said swivel joint and said rotating sleeve containing a channel space, said channel space connecting to said hose end adapter, said hose end adapter connecting to said vacuum air hose and said rotating sleeve connecting to said vacuum air tube.

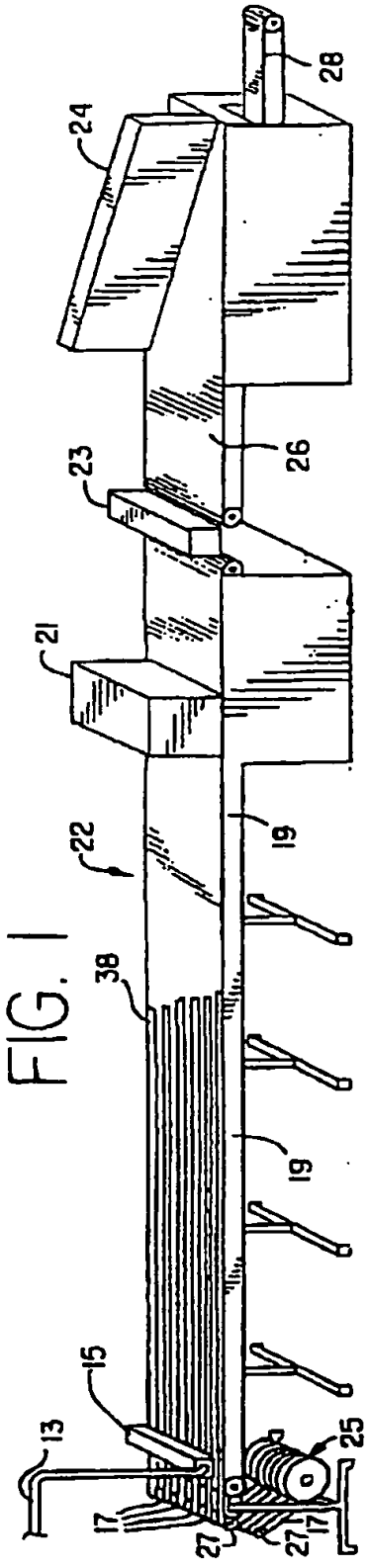
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FIG. 1

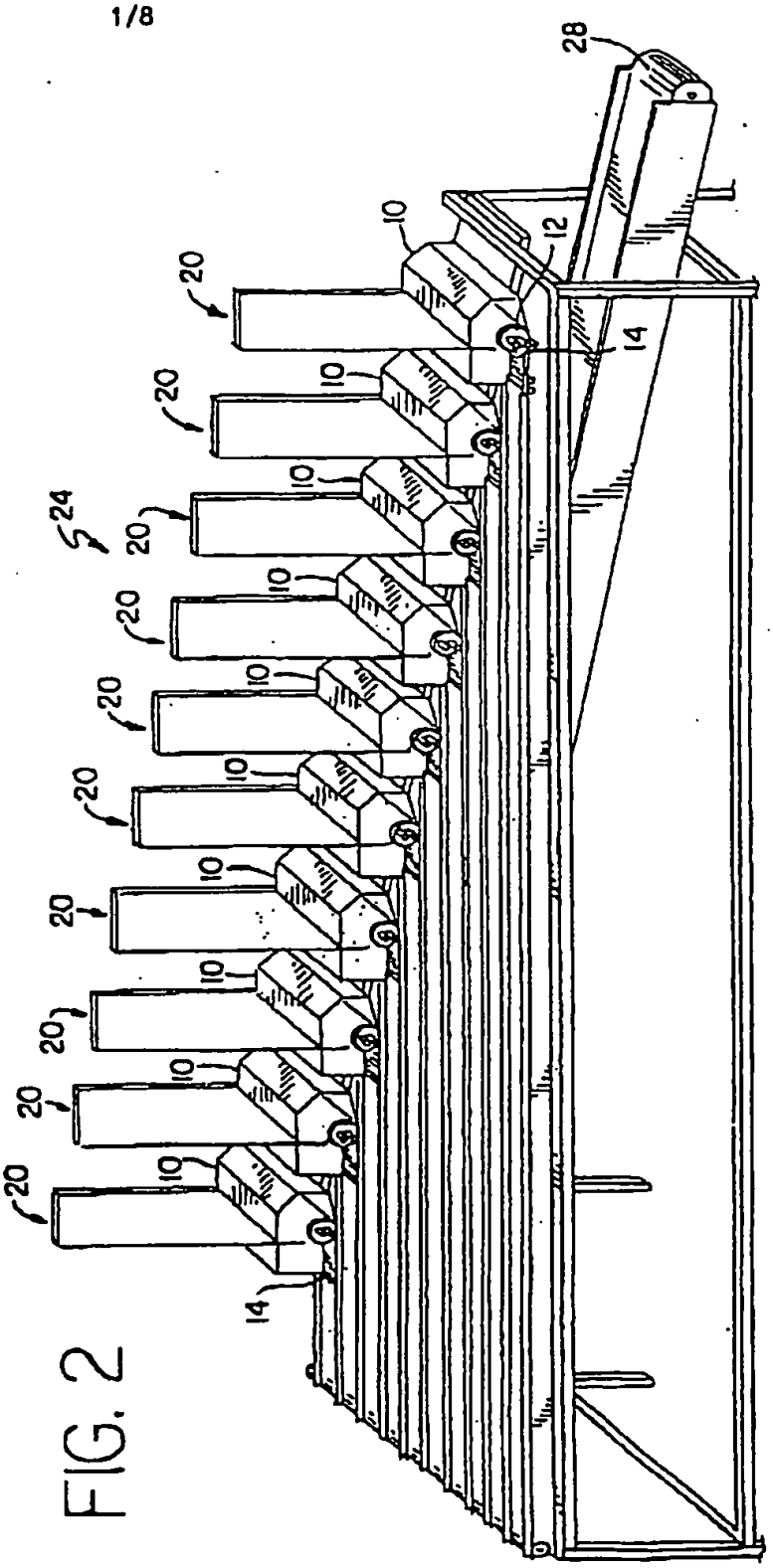
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FIG. 2

FIG. 3

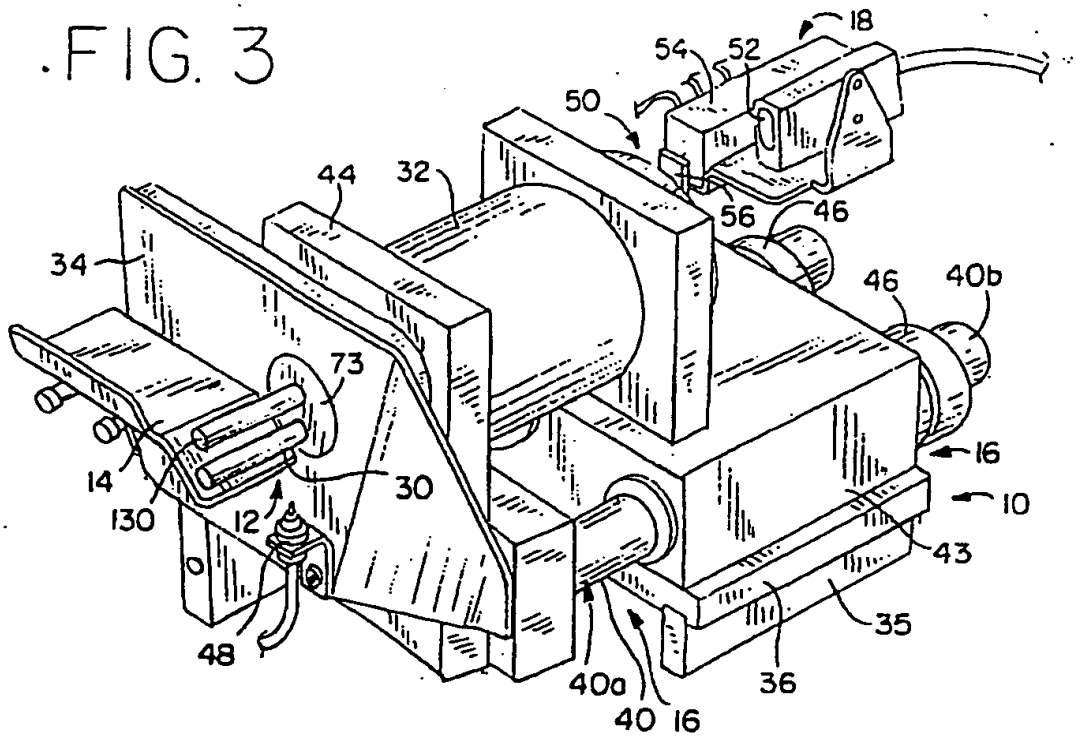
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FIG. 4

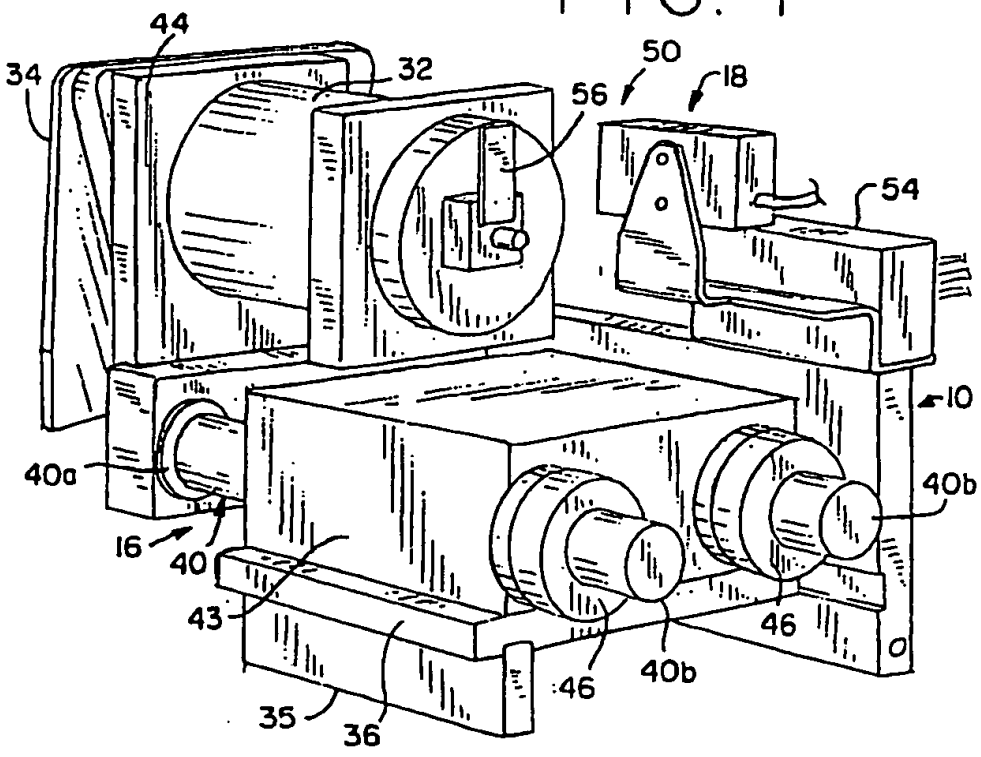
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FIG. 5

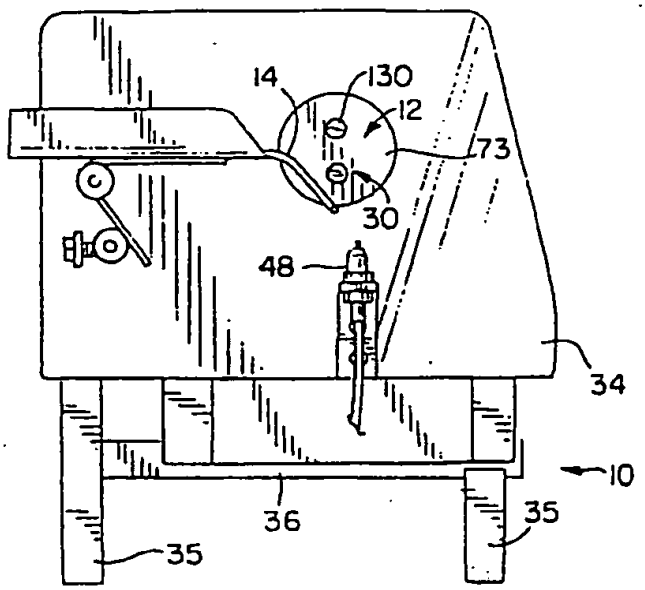


FIG. 6

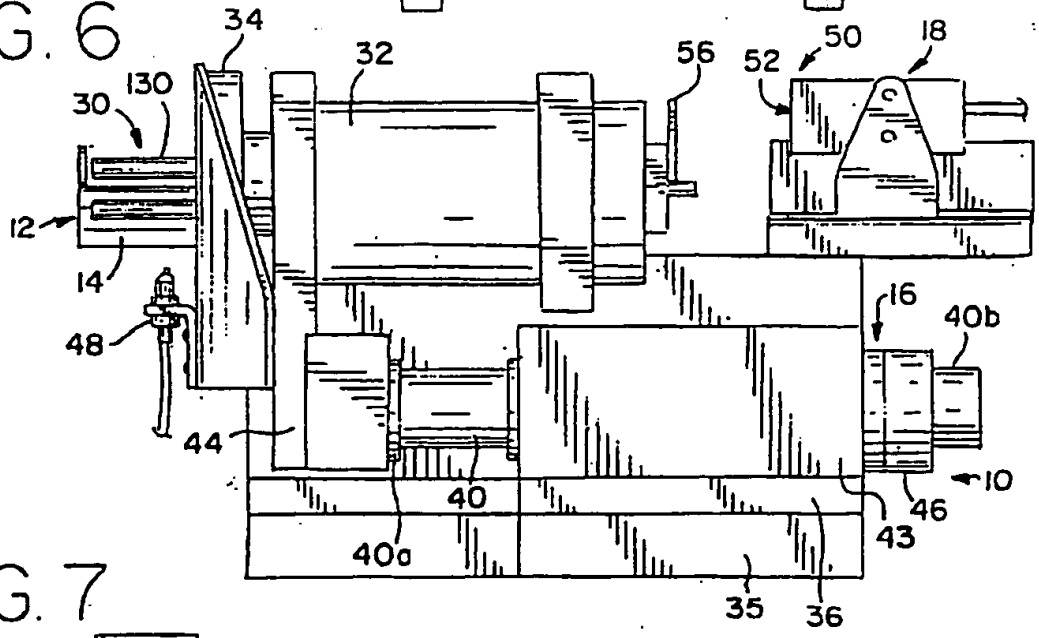
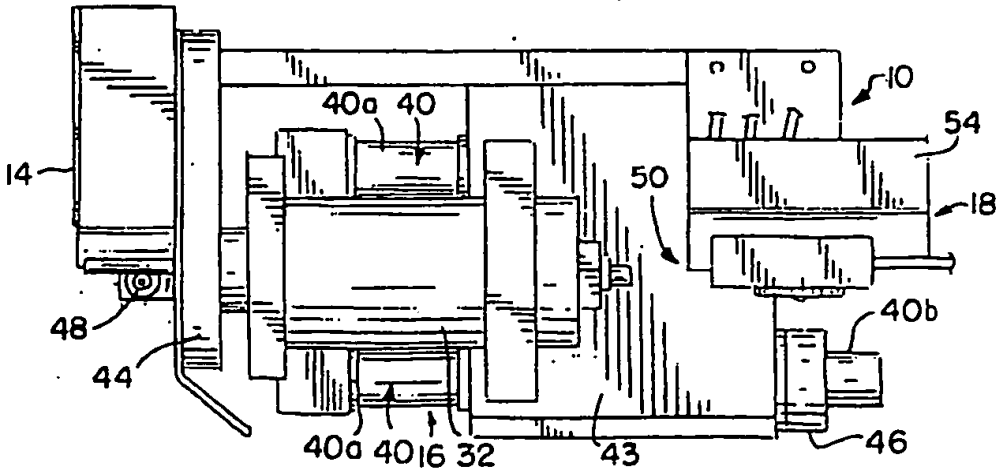
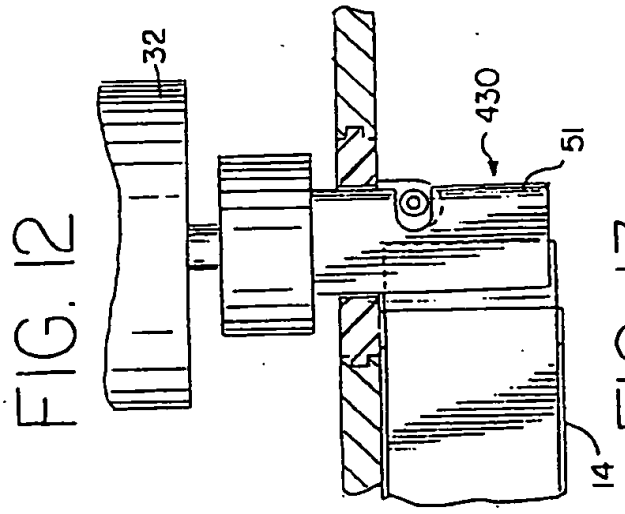


FIG. 7





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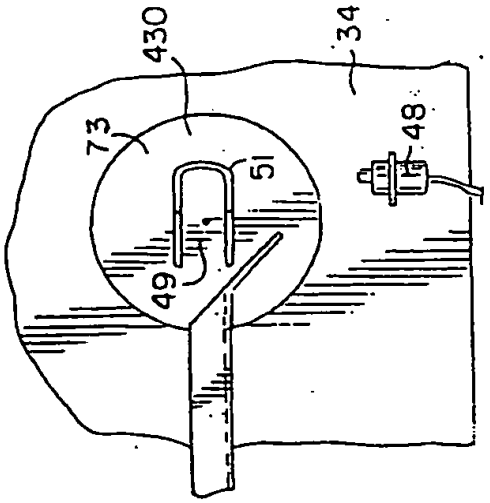

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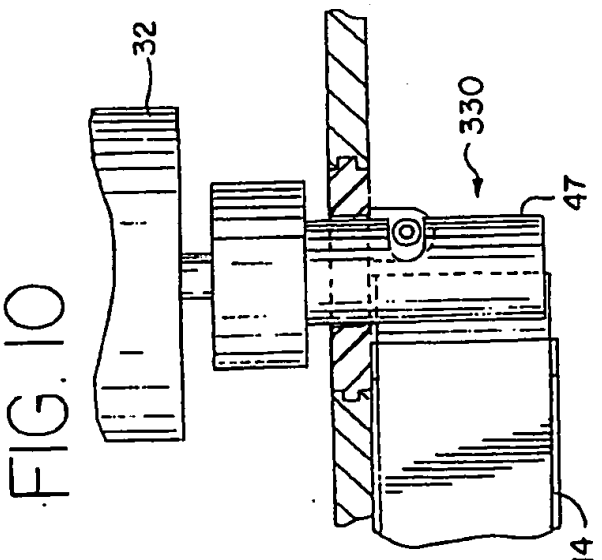


FIG. 10

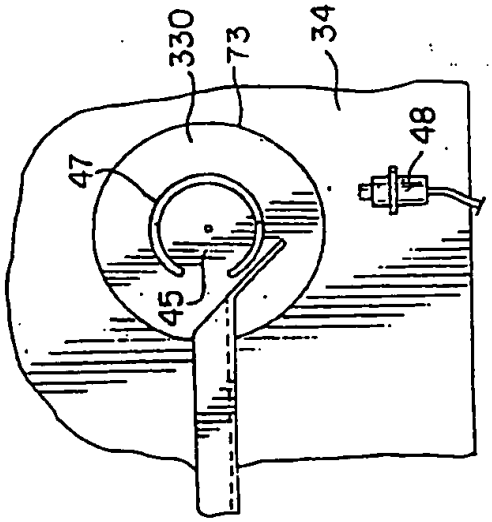
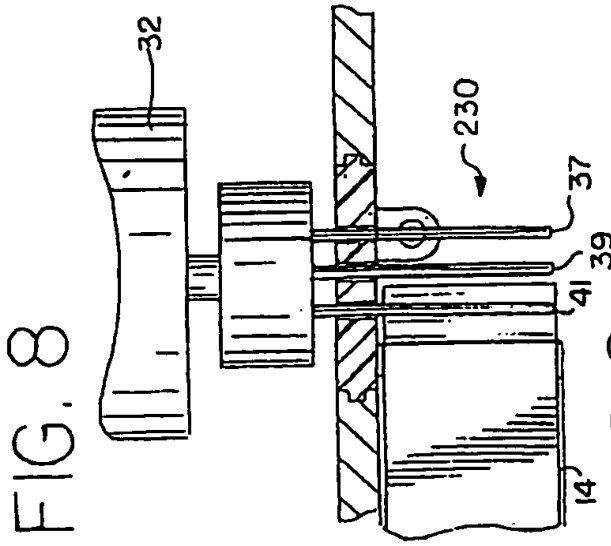


FIG. 11



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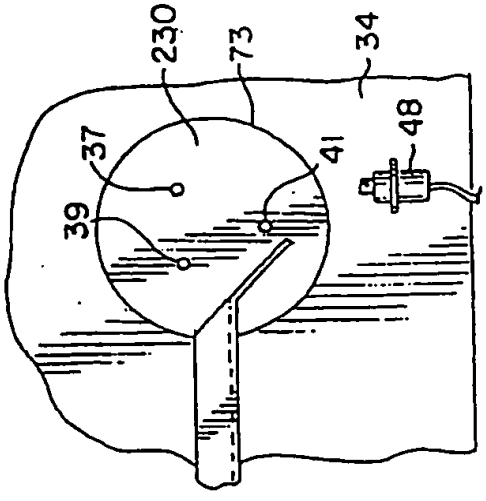

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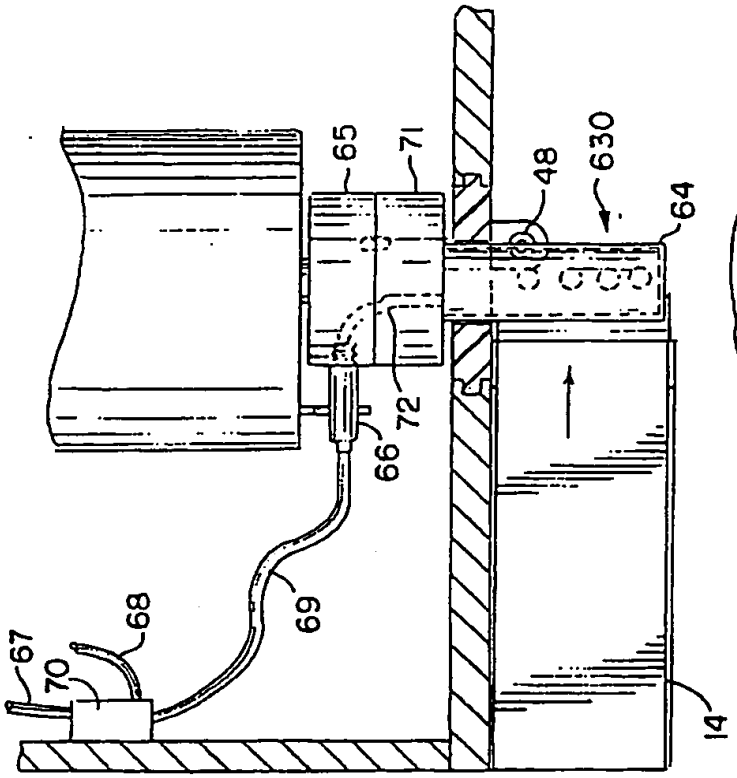

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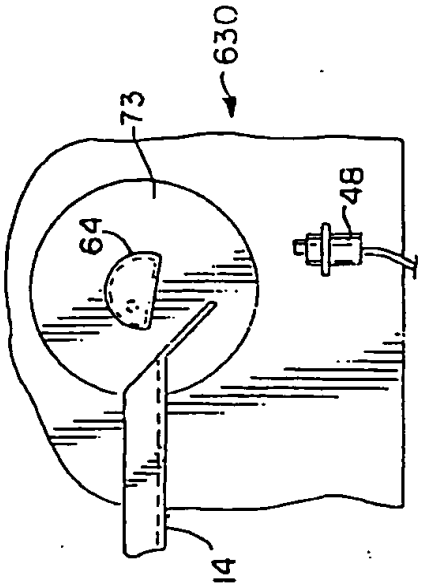
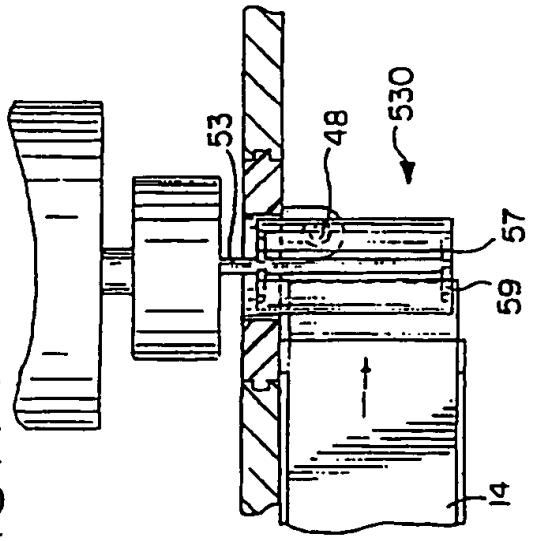


FIG. 17



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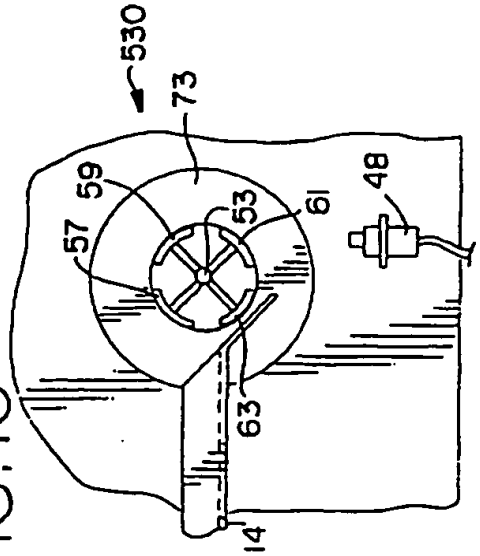
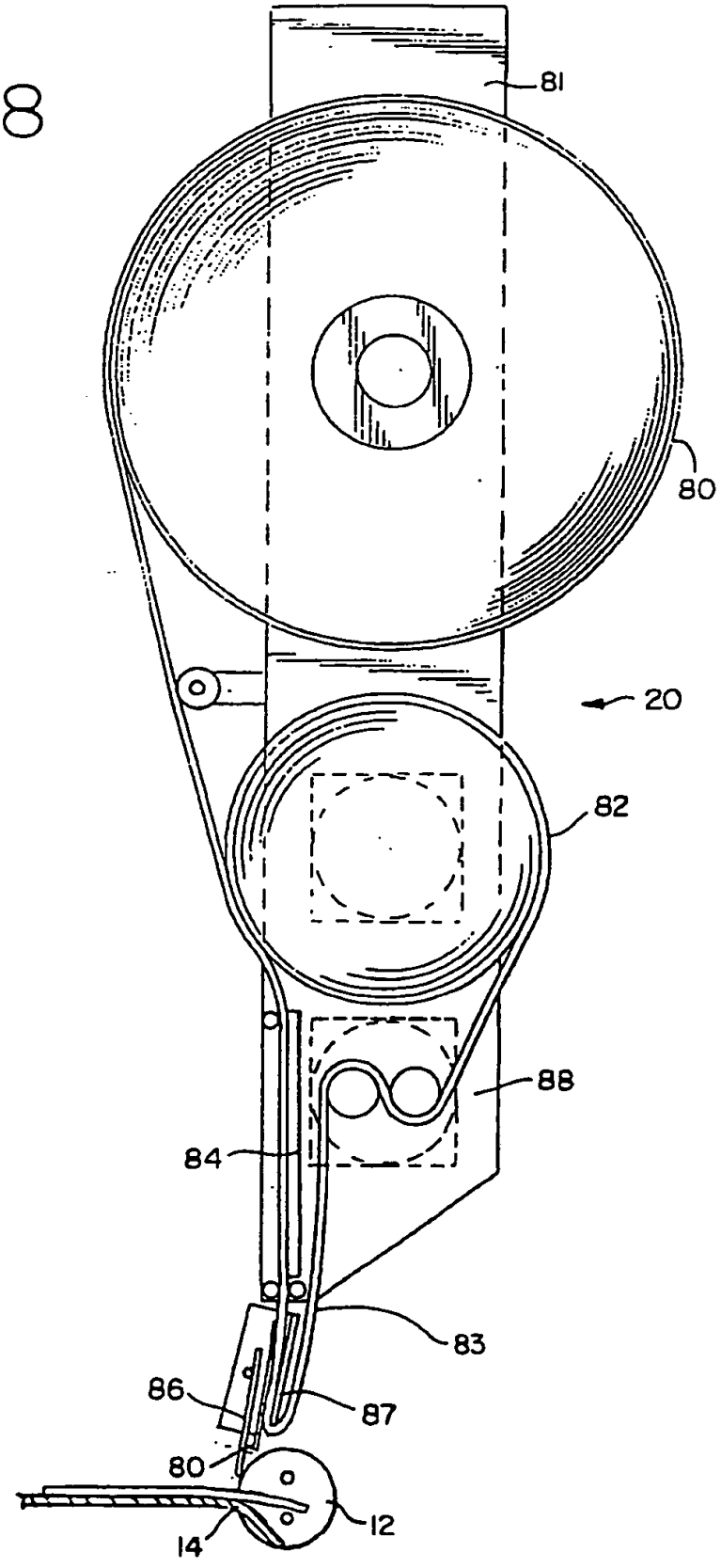


FIG. 15

FIG. 18



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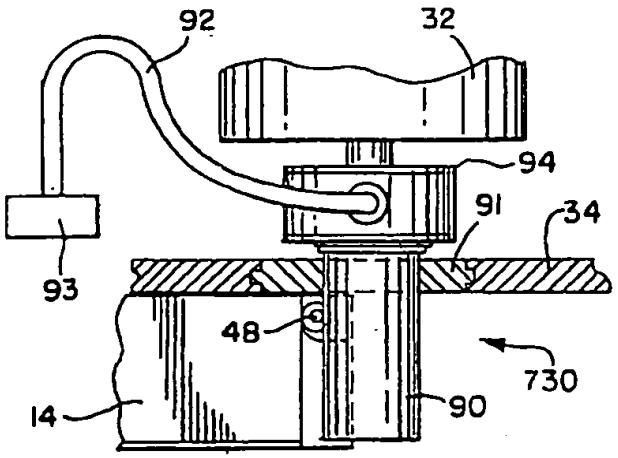

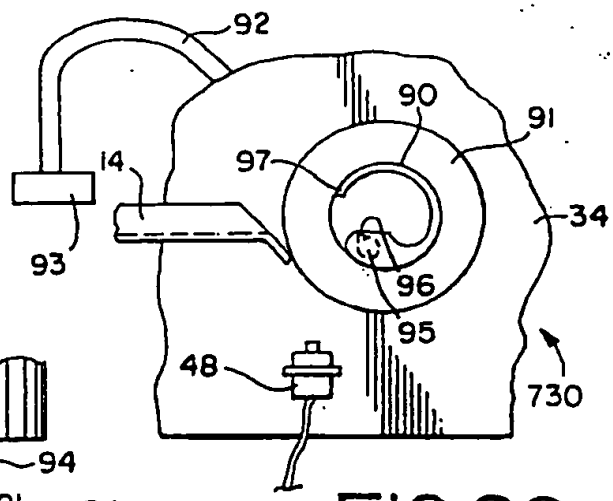

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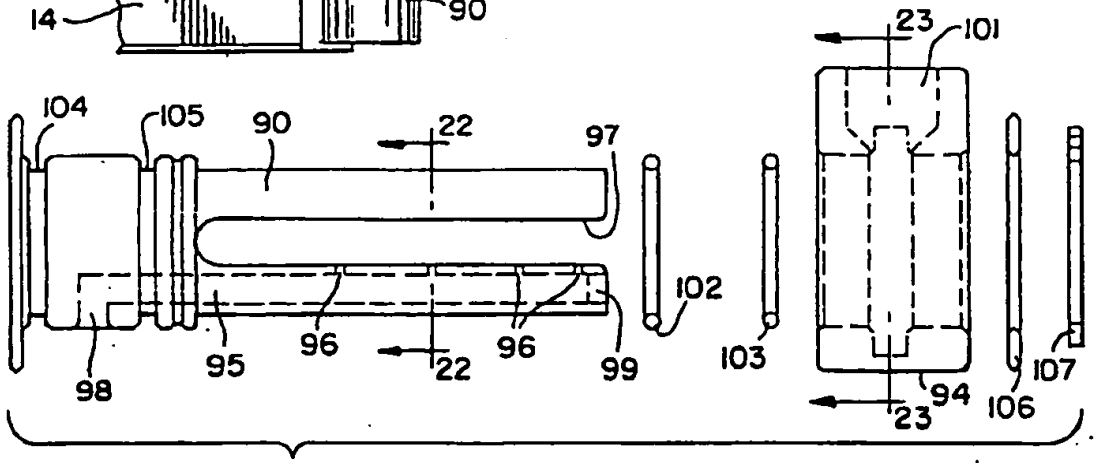


FIG. 21

FIG. 22

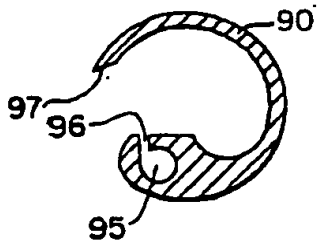
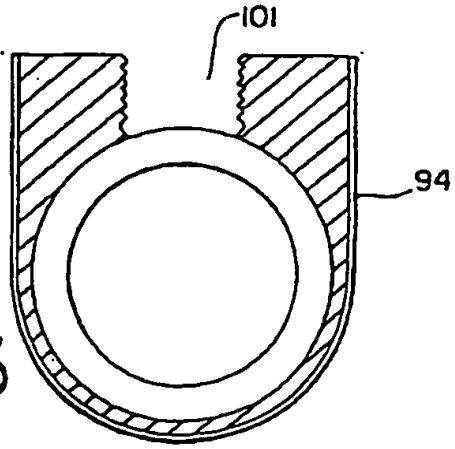


FIG. 23



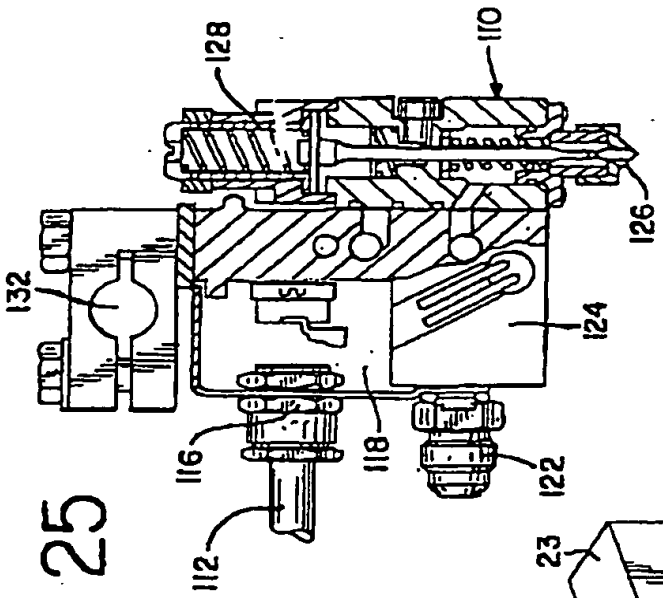


FIG. 25

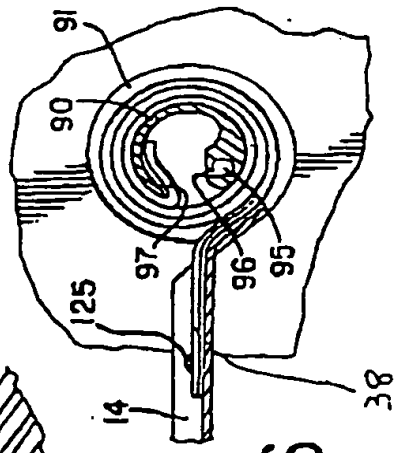


FIG. 26

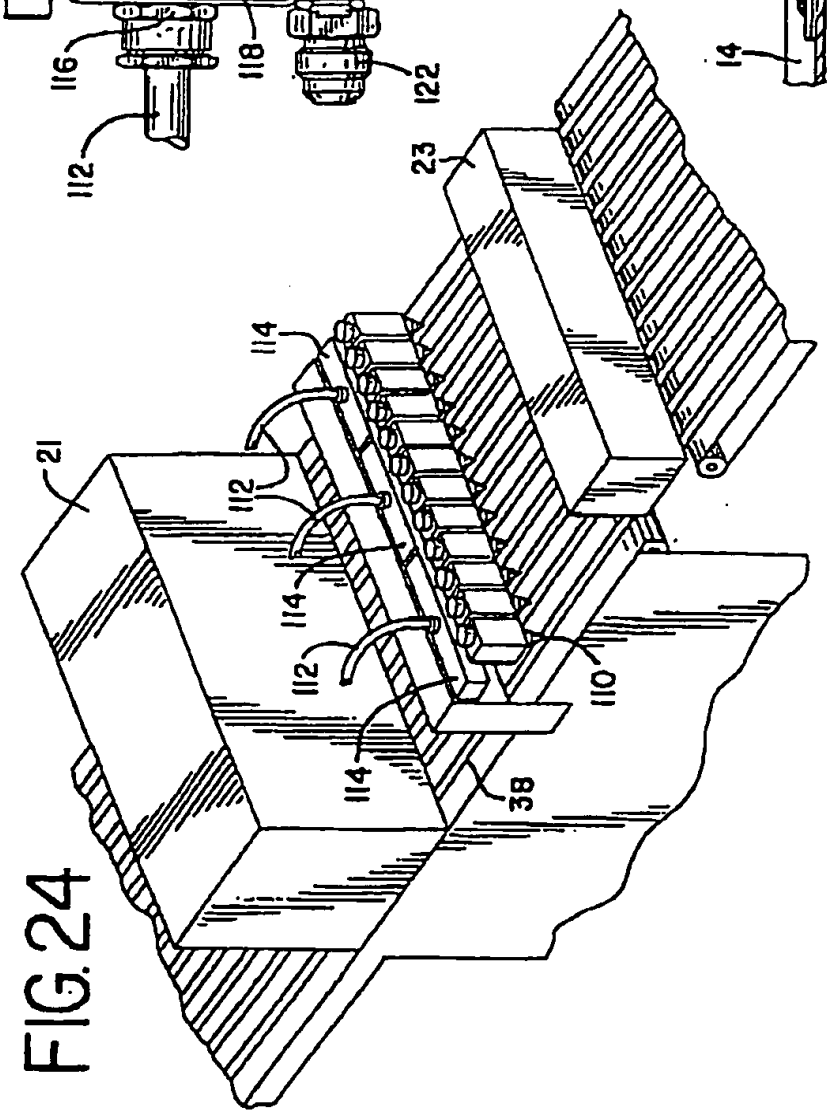


FIG. 24

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US97/04035

A. CLASSIFICATION OF SUBJECT MATTER
IPC(6) :B65H 19/28
US CL :242/532.2,534.2
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
U.S. : 242/532.2,532.6,534.2,332.3,581,587.2

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,205,106 A (ZIMMERMANN ET AL) 27 April 1993 (27/04/93). See entire document.	1,7-17
Y	US 4,535,950 A (LISNYANSKY) 20 AUGUST 1985 (20/08/85). See entire document	1,7-17
Y	US 3,387,800 A (HOAG) 11 JUNE 1968 (11/06/68). See entire document	5,6
Y	US 5,318,237 A (LOTTO ET AL) 07 JUNE 1994 (07/06/94). See entire document	5,6
Y	US 3,642,221 A (HELLEMANS) 15 FEBRUARY 1972 (15/02/72). See entire document	5,6

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19 MAY 1997	08.07.1997
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer JOHN NGUYEN Telephone No. (703) 308-2168

Form PCT/ISA/210 (second sheet)(July 1992)*